ET-302 (A)

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B.Tech. Civil (Construction Management)/ B.Tech. Civil (Water Resources Engineering)
Term-End Examination
June, 2016

ET-302 (A) : COMPUTER PROGRAMMING AND NUMERICAL ANALYSIS

Time : 3 hours   *Maximum Marks : 70*

Note :   *Attempt any five questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a)   Draw a flow chart to read 20 numbers and   7
          to determine its average and standard
          deviation.
    (b)   Write a FORTRAN programme to calculate   7
          the roots of a quadratic equation represented
          by $ax^3 + bx^2 + cx + d = 0$.

2. (a)   What is a file ? Explain the various types of   7
          files used.
    (b)   Write a FORTRAN programme to tabulate   7

          the function $f(x) = \dfrac{x^3 + 1.5x + 5}{x - 3}$ for

          $x = -10$ to 10.

3. (a)   Find the root of the equation $x^3 - 4x - 9 = 0$,   7
          using the bisection method in four stages.
    (b)   Find graphically an approximate value of   7
          the root of equation $3 - x = e^x - 1$.

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4. **(a)** Use Lagrange's formula to compute the value of y, when $x = 9$, if the following values of x and y are given :   **7**

x	5	7	11	13	17
y	150	392	1452	2366	5202

(b) Using Newton - Raphson method, find out the root of the following equation correct to four decimal places :   **7**

$3x = \cos x + 1$

5. **(a)** Determine the eigen values and eigen vectors of the matrix X   **7**

$$X = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

(b) Using the iterative method, find the inverse of matrix A   **7**

$$A = \begin{bmatrix} 1 & 10 & 1 \\ 2 & 0 & 1 \\ 3 & 3 & 2 \end{bmatrix}$$

6. **(a)** Use Runge-Kutta method to find y when $x = 1.2$ in steps of 0.1 given that   **7**

$$\frac{dy}{dx} = x^2 + y^2 \text{ and } y(1) = 1.5.$$

(b) Solve, by Jacobi's iteration method, the equations :   **7**

$20x + y - 2z = 17$
$3x + 20y - z = -18$
$2x - 3y + 20z = 25$

7. (a) Use Romberg's method to compute 7

$$\int_0^1 \frac{dx}{1 + x^2}$$ correct to 4 decimal places.

(b) The table gives the distance in nautical miles 7
of the visible horizon for the given heights
in feet above the earth's surface :

x = height	100	150	200	250	300	350	400
y = distance	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the values of y when $x = 218$ ft and
410 ft.

8. Write short notes on following : 4x3½=14
   (a) Muller's Method
   (b) Round off and Truncation error
   (c) Inverse Power Method
   (d) Eigen Value Problem

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